SUCCESS STORY

Patrick AFB - August 2002

PROACT
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SPOTLIGHT ON: Patrick AFB

Patrick Air Force Base (AFB), located on a barrier island between the Banana River and Atlantic Ocean in Florida, is home to the 45th Space Wing. The 45th Space Wing manages over 23,000 acres of land at Florida's Cape Canaveral Air Force Station (AFS) and its associated facilities, consisting of 14 operating locations, including three airfields, seven launch complexes and 1500 base housing units. Known as the world's premiere gateway to space, the 45th Space Wing provides the United States with air and space launch superiority, global attack capability, rapid global mobility, precision engagement ability, information superiority, and agile combat support. The Wing is also responsible for overseeing launch operations for Department of Defense (DoD) and commercial space programs.

Patrick AFB and the Cape Canaveral AFS encompass over 20,000 acres of beaches, coastal sand dunes, wetlands, and woodlands. The 45th Space Wing is also responsible for 4783 acres at the Malabar and Jonathan Dickinson Missile Tracking Annexes and downrange sites at Antigua Air Station and Ascension Auxiliary Airfield. Aside from natural resources, these facilities maintain numerous artifacts and structures of historical importance to the nation's space program. Protecting these resources requires top-notch environmental professionals capable of developing innovative and aggressive pollution prevention, cleanup and restoration, natural and cultural resource, and compliance programs. The 45th Space Wing's environmental professionals have met these challenges by utilizing partnerships, education, and research to foster a successful environmental program. These efforts have earned the base numerous awards, including several Thomas D. White Awards. The successes described in the following pages highlight a few of the 45th Space Wing's outstanding accomplishments in achieving environmental excellence.

Environmental Success

Pollution Prevention

The 45th Space Wing's proactive environmental management strategy has put them on the forefront of innovative environmental technologies and pollution prevention best management practices. By developing far-reaching goals and evaluating new technologies, the 45th Space Wing has become an exemplary model of the Air Force's commitment to environmental excellence through pollution prevention. By regularly interacting with regulatory agencies, the community, and other interested stakeholders, the 45th Space Wing is successful in finding better and more effective pollution prevention strategies.

Recycling

Patrick AFB's superior recycling program not only surpasses DoD and Air Force goals, but also provides employment opportunities for disadvantaged individuals. Since 1995, a set-aside contract to the National Institute of the Severely Handicapped (NISH), allows the recycling center to be staffed by NISH personnel. The state-of-the-art recycling facility serves as a collection point for oil filters, cardboard, plastic, glass, aluminum, and a variety of other substances. Even universal wastes such as batteries and fluorescent lamps are recycled at Patrick AFB. Currently, over 3000 rags per week, 6300 telephone books, 645 tons of cardboard, 830 tons of steel, and 200,000 gallons of used oil are recycled per year. The 45th Space Wing also recycled or reused over 2500 tons of steel and 2600 tons of concrete from demolition of an old launch complex at Cape Canaveral AFS.

Procurement of advanced recycling equipment is an integral component in the success of the recycling program that has resulted in commendable recycling rates and significant cost savings. Since its purchase, the facility's can crusher has saved approximately $46,800 in drum and disposal costs; an oil filter recycler has extended time between oil changes by nearly 1200%. Overall, the Wing's efforts have resulted in a 52% solid waste diversion rate, which exceeded the Fiscal Year 2000 Air Force goal by 33%.

NISH Personnel at Recycling Center

Affirmative Procurement

Community and installation outreach is critical to the success of the Wing's recycling and affirmative procurement (AP) programs. The 45th Space Wing actively participates in America Recycles Day and Earth Day; they produce a recycling and AP informational brochure, maintain an AP website, and offer AP personnel training. Recent AP projects include using recycled plastic lumber in place of wood for rebuilding a Patrick AFB boat dock and purchasing recycling containers made from post-consumer products. The 45th Space Wing's commitment to closing the recycling loop does not end with base personnel. Architects and engineers performing base service contracts are required to complete an AP form to ensure the use of recycled materials.

Water Conservation

Conserving water at Patrick AFB is a top priority for environmental managers. The area's current water source, an aquifer, is expected to run dry as early as 2005, hastening the importance of extreme conservation measures. In order to facilitate responsible use of water, the base conducted a study of historical irrigation practices to determine if any feasible water reductions could be implemented. The study addressed past irrigation practices, use of consumptive well water, constricted water usage, implementation of irrigation system maps, and xeriscape options. Findings indicated the base was overwatering some vegetation. As a result, regularly calibrated flow meters equipped with rain bypass systems were installed. The base has saved 1,149,280 gallons of water by simply altering the watering schedule based on study recommendations. Patrick AFB has further decreased the strain on water resources by using gray water from the City of Cocoa for irrigation where possible.

Metallizing

The coastal climate at Patrick AFB, Cape Canaveral AFS, Ascension and Antigua islands

is one of the most damaging and corrosive environments in the world. Typically, combating corrosion is an expensive and time-consuming process which requires using large amounts of materials containing hazardous constituents. In cooperation with the Air Force Corrosion Control Program, the 45th Space Wing implemented a more environmentally friendly and less expensive technology to control corrosion at Patrick AFB and its associated facilities. Coating substances with metal alloys, known as metallizing, provides a more corrosive resistant coating than paint. However, past metallizing technologies required large immobile equipment, and were expensive and time consuming.

Recently, the 45th Space Wing successfully implemented a new mobile metallizing technology, decreasing dependence on paints and solvents containing volatile organic compounds (VOCs). The equipment allows a metal alloy to be sprayed on materials with little additional time than traditional painting applications. Metallized materials can remain free from damaging corrosion for up to 20 years, allowing drastic reductions in the use of hazardous materials, personnel exposure to VOCs, and time.

Hazardous Materials/Waste

Space launch missions involve massive quantities of exotic fuels and toxic substances. The unique mission of the 45th Space Wing results in an extensive hazardous material (HAZMAT) management program. To simplify HAZMAT procedures, the 45th Space Wing initiated a user-friendly acquisition system including an electronic HAZMAT flow chart. An old cafeteria at Patrick AFB was completely renovated to serve as the HAZMAT pharmacy and ensure maximum safety and containment of hazardous materials. The pharmacy was divided into three areas based on flashpoint of the material being stored. Flammable substances are stored in an explosion proof area where air is never recirculated. The pharmacy utilizes the Air Force Environmental Management Information System (EMIS) to streamline the HAZMAT acquisition process and ensure no HAZMAT alternatives exist. Since 1992, the 45th Space Wing has reduced Environmental Protection Agency 17 priority pollutants by 50%.

In addition, the Wing has eliminated hazardous waste through the procurement of new technology. Examples include aqueous parts washers, which have eliminated purchase of 1000 gallons of hazardous chemicals; recycling of contaminated rags, which saves $75,000 per year and eliminates a hazardous waste stream; and replacing batteries containing sulfuric acid with gel cell batteries to eliminate storage and safety concerns.

Phytoremediation

The Cape Canaveral AFS landfill began operating in 1969 as a Class I Sanitary Landfill. Until 1987, the landfill accepted municipal waste and construction debris from Patrick AFB and Cape Canaveral AFS. Currently, yard trash, construction and demolition debris, and asbestos wastes are accepted at this unlined landfill. Recent monitoring of ground and surface water in the landfill perimeter indicated elevated concentrations of ammonia were impacting a surface water canal. After evaluating several remedial approaches, the 45th Space Wing selected a form of phytoremediation to control contaminant migration into the canal.

A Vegetative Barrier Systems (VBS) pilot study is being conducted at the landfill to determine if a VBS can effectively reduce ammonia pollution impacts to the canal. The pilot study consisted of selecting a variety of trees including sea grapes and willows whose root systems would uptake ammonia from the shallow groundwater, thereby forming a "barrier" and preventing further contaminant migration. The ammonia can be utilized by vegetation as a nutrient to satisfy

nitrogen demands. VBS trees are watered by a remote irrigation system and are monitored for disease and weed control. Canopy diameter and tree height are measured to refine and validate a water balance model. A weather monitoring station was erected to help protect the vegetation in the event of a freeze.

Vegetative Barrier System

Wastewater Treatment

The Cape Canaveral AFS wastewater treatment facility (WWTF) is a three-ring loop reactor with equalization basin, clarifiers, filtration, aerobic digesters, sludge drying beds, UV disinfection and rapid infiltration basins for effluent disposal. Problems with the plant's UV disinfection began occurring shortly after startup; parts were no longer available and the equipment frequently malfunctioned, making it difficult to maintain and expensive to run. In addition, no chlorine residual was available to assure proper disinfection. Alternatives were evaluated and a portable on-site chlorine generator was tested and selected. Now instead of hauling hazardous bulk chlorine over Cape Canaveral AFS roadways and subjecting WWTF operators to the dangers of high strength chlorine, the on-site chlorine generation system uses salt and electrolysis to produce a low strength, non hazardous 0.8% sodium hypochlorite solution for disinfection. This will save transporting and operator handling of over 24,000 gallons of hazardous material.

Natural Resources

Considering the activities performed at the installations, it is a monumental task to ensure over 23,000 acres of sandy beaches, coastal sand dunes, fresh and salt-water wetlands, woodlands, and fragile sensitive coastal dune ecosystems remain capable of supporting wildlife habitat. The 45th Space Wing manages over 45 species of endangered, threatened or protected plants and animals between Patrick AFB, Cape Canaveral AFS, and downrange facilities. As a result of the Wing's commitment and significant achievements, the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission have designated the 45th Space Wing as "the model to follow in protecting threatened and endangered species."

Sea Turtles

Patrick AFB and Cape Canaveral AFS are part of the second largest loggerhead sea turtle nesting region in the world. The beaches provide habitat for more than 5000 threatened and endangered sea turtle nests that yield over 500,000 hatchlings per year. A significant number of green turtles and some rare leatherback sea turtles also use installation beaches for nesting.

The 45th Space Wing began a turtle monitoring and protection program in 1984, resulting in a hatchling success ratio of 70%, exceeding the USFWS Recovery Plan goal of 50%. One of the most important elements of successful turtle nesting management is ensuring hatchling survival. Hatchlings use moonlight reflecting off breaking waves to guide them to the ocean. Artificial inland and beach lights disorient hatchlings causing them to move inland where they become prey or starve to death. To reduce the impact of artificial lighting on hatchling survival, Cape Canaveral AFS implemented a light management plan at each launch complex. The plan includes requirements for erecting visual

shields to prevent disorientation of hatchlings due to operational lights, replacing exterior lights with low-pressure sodium fixtures, elimination of nonessential lights, and operation constraints.

Leatherback Sea Turtle

In 1994, 23 nest disorientations were documented at Cape Canaveral AFS. Just three years later, after implementation of their light management plan, only two disorientation occurrences were documented.

Scrub Jays

Florida scrub jays, a federally threatened species, dwell in specialized coastal scrub habitat. Scrub habitat is composed of low, dense thickets with numerous open, sandy spaces, which has been drastically reduced through urban development, agricultural cultivation, and containment of natural wildfires.

Scrub Jay

Currently, Cape Canaveral AFS supports the third largest population of the scrub jays in the state. The presence and health of the scrub jay population indicates suitable habitat conditions for other protected species, such as the gopher tortoise and indigo snake. Therefore, Cape Canaveral AFS personnel closely monitor the health and habitat of its scrub jay population. Historically, lightning induced and wind fed wildfires maintained a balanced coastal scrub habitat. However, ensuring integrity of the nation's space program and protecting irreplaceable historical and cultural resources at Cape Canaveral AFS requires wildfires to be contained. As a result, Cape Canaveral AFS' scrub habitat has been overtaken by oak forest, causing a drastic decline in scrub species populations and providing an overabundance of fuel, which could result in large wildfires.

To restore the scrub habitat, the 45th Space Wing, the Cape Canaveral AFS Environmental Support Contractor (ESC), and the USFWS formed a team to establish a controlled burn program at Cape Canaveral AFS. Controlled burning mimics the effects of natural wildfires, improving scrub and wildlife habitat quality, and reducing fire hazards. In addition, controlled burning facilitates the nutrient cycle and enhances security visibility at the installation. Before conducting a controlled burn, the team coordinates with launch operators, contractors, and the adjacent National Aeronautics and Space Administration (NASA) to ensure smoke will not impact space program activities. Overgrown areas are then mechanically cleared of larger vegetation, firelines are established to prevent unwanted spreading, and the USFWS monitors the burn. Afterwards, the team works to maintain biodiversity and improve scrub quality by deterring exotic plant invasion.

Wetland Restoration

By developing a working group that includes all major installations organizations, the 45th Space Wing succeeded in streamlining the Environ-

mental Impact Analysis Program (EIAP). The group reviews all policy changes, documents, questions and concerns regarding EIAP. Since the group began meeting they have developed new procedures, agreed upon policy, and resolved several controversial issues. One successful example attributed to the new EIAP procedures has been the restoration of over 150 acres of wetlands at Cape Canaveral AFS. The effects of abandoned launch facilities used decades earlier had altered water chemistry resulting in a significant loss in biodiversity and erecting a breeding ground for millions of mosquitoes. The EIAP group worked together to develop and implement restoration procedures.

Beach Erosion

The 45th Space Wing's natural resources team launched an $8.3 million program to restore eroded beaches at Patrick AFB. In calendar year 2001, they completely restored 75% of the beach. When Brevard County received funding to nourish 9.5 miles of the beach north of Patrick AFB, the 45th Space Wing seized the opportunity, partnered with the county, and saved approximately $1 million by utilizing already completed and approved permits, environmental assessments, consultations and contracts. Restoration involved planting 167,000 native coastal plants to stabilize sand dunes. Studies completed after restoration found the nurtured beaches to be as successful as non-nourished, undamaged beaches. To ensure restored dune ecosystems remain unharmed, pedestrian crossovers were erected to allow access to beaches without disruption to the dunes. Measures to restore natural contours of the ocean floor have also been undertaken as part of the beach restoration process.

Cultural Resources

The 45th Space Wing actively manages programs to conserve and enhance cultural resources located at Patrick AFB, Cape Canaveral AFS and down-range facilities. Shortly after the land was exposed from the sea over 4000 years ago, portions of what is now Cape Canaveral AFS was inhabited by the Ais Native American tribe. Currently, pre-servationists at Cape Canaveral AFS have identified 33 Native American archaeological sites including a burial mound. Immigrant settlers also inhabited portions of the cape, leaving behind cemeteries and other artifacts.

In concurrence with their cultural resource management plan, development that is expected to adversely affect the irreplaceable resources is prohibited. The 45th Space Wing also ensures protection of various historical structures at Patrick AFB and Cape Canaveral AFS. Patrick AFB is home to several structures erected by the Navy during the base development in the 1940s, protected under the National Historic Preservation Act. Cape Canaveral AFS maintains a lighthouse erected in 1868, the launch site of the first American satellite and manned space flights, and several other protected historical structures.

Space and Missile Museum

The Air Force Space and Missile Museum at Cape Canaveral AFS provides visitors with an informative account of the United State's ventures into space. The museum displays numerous missiles, rockets and related space equipment on the grounds of Space Launch Complex 5/6, where the first two United States manned space flights originated. An authentically restored blockhouse sits 400 feet from twin launch pads and allows visitors to observe launch control and firing rooms equipped with much of the original computers, consoles and launch support equipment. Adjacent to the blockhouse, the exhibit hall features numerous space-related displays on the important role of the Air Force in development of space exploration as well as its continuing involvement. The outdoor Rocket Garden exhibits 55 rockets, including one-of-a-kind examples, which are displayed against the backdrop of active Delta launch pads.

Partnerships

The 45th Space Wing's environmental commitment has facilitated numerous partnering relationships between regulators, stakeholders, contractors and other interested parties committed to reducing environmental impacts, maintaining compliance, and protecting cultural and historical resources.

Environmental Partnership

The Space Coast Interagency Environmental Partnership is a formalized network whose goal is to convert the busiest spaceport in the world into a small quantity hazardous waste generator. The partnership is divided by program area into four tiers who meet on a regular basis to discuss permit and other environmental program requirements and initiatives. The open forum has allowed the base to avoid enforcement actions and miscommunications between regulatory agencies, the Air Force, and other interested parties. Development of the new Evolved Expendable Launch Vehicle program, the next generation rocket, is being managed through the partnership with great success.

Discharge Monitoring Report

For the past two years, Patrick AFB has participated in an ongoing pilot study conducted by the Florida Department of Environmental Protection to test a new electronic discharge monitoring report (EDMR). In the past, operators manually completed time-consuming wastewater forms, which would then be reviewed before submittal. In order to streamline this process, reduce error, and provide a quicker response time, the environmental professionals at Patrick AFB have worked closely with the state to troubleshoot and improve the new process before it is implemented within other facilities. EDMR will also allow state and facility personnel to review trend analyses and reduce preparation time for large reports.

Green Golf Course

The combined efforts of the 45th Space Wing and the manager of Patrick AFB's Manatee Cove Golf Course have earned the base recognition from Audubon International. The team received certification in environmental planning from the Audubon Cooperative Sanctuary System, an international program administered by Audubon International. Only two other Air Force bases have received this distinguished certification. During the certification process, Audubon International assisted the base in implementing measures to preserve and enhance the environmental quality of the golf course through wildlife management and conservation efforts. Projects included building osprey-nesting platforms and bat houses, introducing carp to rid ponds of unwanted vegetation, utilizing integrated pest management techniques, conserving water, and maintaining habitat for wildlife. The project is an illustrated success of sustainability.

Commitment to the Future

The outstanding environmental success achieved by the 45th Space Wing is a result of extraordinary cooperation and dedication of various military, contractor, community, and regulatory entities. Each team member incorporates the Wing's creed "Our mission is space, Our responsibility the earth…" into daily operations. Through outreach, partnerships, and dedication, the 45th Space Wing illustrates the ability for complex missions to be executed without environmental degradation. By maintaining a commitment to preserving natural and cultural resources, pollution prevention, and remaining on the forefront of new technology, the 45th Space Wing will continue to successfully integrate environmental excellence at the nation's premier gateway to space.

Pollution Prevention Success Stories - Patrick AFB, August 2002

Success stories are a product of PROACT, a service of the Environmental Quality Directorate, Headquarters Air Force Center for Environmental Excellence (HQ AFCEE/EQ), Brooks AFB, Texas. Any comments or suggestions are welcomed and should be directed to PROACT at DSN 240-4240, (800) 233-4356, or pro-act@brooks.af.mil.

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